

Claims

[c1] What is claimed is:

1. A micromachined capacitive pressure sensor including:

a plurality of sealed micromachined capacitive cells of type 1, each cell including a rectangular membrane supported above a common conductive electrode by an insulating support and each membrane supporting a conductive electrode for movement therewith whereby each electrode forms with the common conductive electrode a capacitor whose capacitance varies with movement of the membrane relative to the common electrode;

a cavity region formed by the said membrane and the said conductive electrode; and

conductive lines interconnecting conductive electrodes of adjacent cells of type 1;

a plurality of micromachined capacitive cells of type 2, each cell including a rectangular film stack on a common conductive electrode by an insulating support and each stack supporting a conductive electrode therewith whereby each electrode forms with the common conductive electrode a capacitor whose capacitance does not vary with movement of the film stack; and

conductive lines interconnecting conductive electrodes of adjacent cells of type 2.

- [c2] 2. A micromachined capacitive pressure sensor as in claim 1 in which the cells of type 1 and type 2 are arranged in a plurality of two-dimensional matrix.
- [c3] 3. The method of operating a micromachined capacitive pressure sensor of the type that includes:
a plurality of micromachined capacitive cells of type 1 arranged in a two-dimensional matrix over a broad frequency band, said cells each comprising a membrane supported by an insulating support above a common conductive electrode with a conductive electrode on each of said membranes to form with said spaced common electrode a capacitor;
a plurality of micromachined capacitive cells of type 2 arranged in a two-dimensional matrix over a broad frequency band, said cells formed with film stacks on a common conductive electrode by an insulating support and each stack supporting a conductive electrode there-
with whereby each electrode forms with the common conductive electrode a capacitor;
said method comprising connecting said cells of type 1 and type 2 in series with conductive connecting lines whereby said connecting lines and said capacitors form a high frequency transmission line whose length varies

with changes in the capacitance of said cells type 1 and type 2 and inductance of said lines, applying a high frequency RF voltage to said high frequency transmission lines, and determining the change in electrical length of the lines responsive to a received pressure signal to provide an output signal representative of the pressure signal.

[c4]

4. A micromachined capacitive pressure sensor including:

a plurality of micromachined capacitive pressure sensor cells of type 1 arranged in a two-dimensional matrix, each cell including a membrane supported above a common conductive electrode by an insulating support and each membrane supporting a conductive electrode for movement therewith whereby each electrode forms with the common conductive electrode a capacitor whose capacitance varies with movement of the membrane relative to the common electrode,

a plurality of micromachined capacitive cells of type 2 arranged in a two-dimensional matrix, each cell including a rectangular film stack on a common conductive electrode by an insulating support and each stack supporting a conductive electrode therewith whereby each electrode forms with the common conductive electrode a capacitor whose capacitance does not vary with movement of the

film stack;

a conductive line interconnecting all conductive electrodes of cells of type 1 in said array in series, whereby the inductance of said conductive line and the capacitance of said capacitors form a high frequency transmission line whose electrical length changes in response to movement of said membrane.

a conductive line interconnecting all conductive electrodes of cells of type 2 in said array in series, whereby the inductance of said conductive line and the capacitance of said capacitors form a high frequency transmission line whose electrical length does not change in response to movement of said film stack.

a co-planar structure forming a high frequency transmission line interconnecting all conductive electrodes of cells of types 1 and 2 in said array in series.

[c5] 5. A micromachined capacitive pressure sensor as in claim 4 in which the cells of type 1 and type 2 are arranged in a scalable two-dimensional matrix.

[c6] 6. A micromachined capacitive pressure sensor as in claim 4 or 5 in which the membranes and film stacks are rectangular, with the longer end along with the transmission lines.

[c7] 7. The method of operating a micromachined capacitive

pressure sensor of the type which includes a plurality of micromachined capacitive cells of type 1 and type 2 arranged in a two-dimensional matrix over a broad frequency band, said cells of type 1 each comprising a membrane supported by an insulating support above a common conductive electrode with a conductive electrode on each of said membranes to form with said spaced common electrode a capacitor, said cells of type 2 comprising a rectangular film stack supported by an insulating support on a common conductive electrode with a conductive electrode on each of said film stack to form with said spaced common electrode a capacitor, said method comprising:

connecting said cells of type 1 and type 2 in series with conductive connecting lines whereby said connecting lines and said capacitors form a high frequency transmission line whose length varies with changes in the capacitance of said cells of type 1 and type 2 and inductance of said lines,

applying a high frequency RF voltage to said high frequency transmission lines,

determining the change in electrical length of the line formed by said cells of type 1 in responsive to a received pressure signal to provide an output signal representative of the pressure signal, and

means of connected to said transmission lines for deter-

mining the absolute pressure level.

- [c8] 8. The method of operating a micromachined capacitive pressure sensor of the type which includes a plurality of micromachined capacitive cells of type 1 and type 2 arranged in a two-dimensional matrix over a broad frequency band, said cells of type 1 each comprising a membrane supported by an insulating support above a common conductive electrode with a conductive electrode on each of said membranes to form with said spaced common electrode a capacitor, said cells of type 2 comprising a rectangular film stack supported by an insulating support on a common conductive electrode with a conductive electrode on each of said film stack to form with said spaced common electrode a capacitor, said method comprising:
- connecting said cells of type 1 in series with conductive connecting lines whereby said connecting lines and said capacitors form a high frequency transmission line whose length varies with changes in the capacitance of said cells of type 1 and inductance of said lines,
- connecting said cells of type 2 in series with conductive connecting lines whereby said connecting lines and said capacitors form a high frequency transmission line whose length varies with changes in the capacitance of said cells of type 2 and inductance of said lines,

applying a high frequency RF voltage to said high frequency transmission lines,
determining the change in electrical length of the lines formed by said cells of type 1 relative to the lines formed by said cells of type 2 in responsive to a received pressure signal to provide an output signal representative of the pressure signal, and
means of connected to said transmission lines for determining the absolute pressure level.

- [c9] 9. A method of claim 8 including an additional pair of transmitting and receiving antennas to allow the determination of pressure signal remotely.